



(11) **EP 2 469 737 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:
09.01.2019 Bulletin 2019/02

(51) Int Cl.:
H04W 72/12 ^(2009.01) **H04W 56/00** ^(2009.01)
H04W 74/00 ^(2009.01) **H04W 4/80** ^(2018.01)

(21) Application number: **10810212.0**

(86) International application number:
PCT/KR2010/005561

(22) Date of filing: **20.08.2010**

(87) International publication number:
WO 2011/021904 (24.02.2011 Gazette 2011/08)

(54) **METHOD AND APPARATUS FOR ADJUSTING SIGNAL TRANSMISSION STARTING POINT OF
TERMINAL IN WIRELESS NETWORK**

VERFAHREN UND VORRICHTUNG ZUR EINSTELLUNG DES
SIGNALÜBERTRAGUNGS-STARTPUNKTS EINES ENDGERÄTES IN EINEM DRAHTLOSEN
NETZWERK

PROCÉDÉ ET APPAREIL D'AJUSTEMENT D'INSTANT DE DÉBUT D'ÉMISSION DE SIGNAL D'UN
TERMINAL DANS UN RÉSEAU SANS FIL

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO SE SI SK SM TR**

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(30) Priority: **21.08.2009 KR 20090077490**

(43) Date of publication of application:
27.06.2012 Bulletin 2012/26

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(60) Divisional application:
18195029.6

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Description

BACKGROUND OF THE INVENTION

(a) Field of the Invention

[0001] The present invention relates to a method and apparatus for adjusting transmission time of a terminal in a wireless network.

(b) Description of the Related Art

[0002] In line with the advancement in information communication technology, various wireless communication techniques are being developed. Among them, a wireless local area network (WLAN) uses a technique of allowing a user to wirelessly access the Internet at homes, in offices, or in a particular service providing area by using a terminal based on a radio frequency technique. A wireless personal area network (WPAN) uses a technique for wirelessly connecting devices within a relatively short distance to allow for data transmission and control. The WPAN includes, for example, Bluetooth™, Zig-Bee™, ultra-wide band (UWB), and the like.

[0003] In a wireless network environment such as the WLAN, the WPAN, and the like, a plurality of terminals operate independently. Thus, in order for the terminals to cooperatively communicate within the wireless network, a technique that may causes signals transmitted by the plurality of independently operating terminals reach a particular terminal at the same time point is required.

[0004] The above information disclosed in this Background section is only for enhancement of understanding of the background of the invention and therefore it may contain information that does not form the prior art that is already known in this country to a person of ordinary skill in the art.

[0005] Document US2004/058653 discloses a transceiver in CDMA system comprising a receiver to receive coded information signals and a transmitter to transmit coded information signals. The transceiver further comprises a local oscillator providing a time and frequency reference for the receiver and the transmitter; a timing controller providing timing signals for the receiver and the transmitter; a signal processor decoding received signals to determine a common error associated with the timing controller and a timing correction circuit smoothly adjusting the timing of the coded information signals transmitted by the transmitter responsive to the timing error to reduce the timing error over a desired time interval.

SUMMARY OF THE INVENTION

[0006] The present invention is defined in the independent claims. The dependent claims define advantageous embodiments thereof.

[0007] The present invention has been made in an effort to provide a method for adjusting time points at which a plurality of independently operating terminals transmit signals in a wireless network.

5 [0008] An exemplary embodiment of the present invention provides a method for adjusting, by a first terminal, a transmission time point of at least one second terminal in a wireless network, the method comprising: setting a transmission time point of the second terminal and transmitting a first request frame including information on the transmission time point to the second terminal; receiving a first response frame transmitted according to the transmission time point from the second terminal; and adjusting the transmission time point based to an arrival time of the first response frame.

10 [0009] Another embodiment of the present invention provides a method for synchronous transmission of a terminal in a wireless network, the method comprising: transmitting a first request frame including transmission time point information to a plurality of terminals that independently operate; receiving first response frames transmitted according to the transmission time point information from the plurality of terminals; calculating an arrival time of each of the first response frames; adjusting the transmission time point information such that the difference between the arrival time and an estimated arrival time is within an allowable error range; and retransmitting a second request frame including the adjusted transmission time point information to the plurality of terminals.

20 [0010] Yet another embodiment of the present invention provides a terminal including: a wireless communication unit transmitting a request frame including transmission time point information with respect to a plurality of terminals to the plurality of terminals and receiving response frames transmitted from the plurality of terminals according to the transmission time point information; and a controller calculating the difference between an actual arrival time and an estimated arrival time of each of the response frames, adjusting the transmission time point information by reflecting the difference, and configuring a request frame such that the request frame includes the adjusted transmission time point.

30 [0011] According to exemplary embodiments of the present invention, signals transmitted by a plurality of terminals that operate independently in a wireless network can arrive at a particular terminal at the same time point. Therefore, cooperative communication can occur, and the terminal receiving the signals from the plurality of terminals can obtain good reception performance.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

55 FIG. 1 is a view illustrating transmission of signals by a plurality of terminals to a common terminal in a wireless network.

FIG. 2 is a schematic block diagram of a terminal

according to an exemplary embodiment of the present invention.

FIG. 3 is a flowchart illustrating the process of a method for adjusting transmission time points of terminals according to an exemplary embodiment of the present invention.

FIGS. 4 and 5 are views illustrating adjusting, by a common terminal, time points of signal transmissions of a plurality of synchronous transmission terminals according to an exemplary embodiment of the present invention.

FIG. 6 is a view illustrating time points at which signals transmitted by the synchronous transmission terminals according to the exemplary embodiments of FIGS. 4 and 5 arrive at the common terminal.

FIGS. 7 and 8 are views illustrating adjusting, by a common terminal, transmission time points of a plurality of synchronous transmission terminals according to another exemplary embodiment of the present invention.

FIG. 9 is a view illustrating time points at which signals transmitted by the synchronous transmission terminals according to the exemplary embodiments of FIGS. 7 and 8 arrive at the common terminal.

FIG. 10 is a flowchart illustrating the process of a method for adjusting a signal transmission time point by the common terminal and the plurality of synchronous transmission terminals according to an exemplary embodiment of the present invention.

FIG. 11 is a flowchart illustrating the process of a method for adjusting a signal transmission time point by the common terminal and the plurality of synchronous transmission terminals according to another exemplary embodiment of the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0013] In the following detailed description, only certain exemplary embodiments of the present invention have been shown and described, simply by way of illustration. As those skilled in the art would realize, the described embodiments may be modified in various different ways, all without departing from the scope of the present invention. Accordingly, the drawings and description are to be regarded as illustrative in nature and not restrictive. Like reference numerals designate like elements throughout the specification.

[0014] Throughout the specification, unless explicitly described to the contrary, the word "comprise" and variations such as "comprises" or "comprising" will be understood to imply the inclusion of stated elements but not the exclusion of any other elements.

[0015] In the present disclosure, a terminal may be referred to as a mobile station (MS), a mobile terminal (MT), a subscriber station (SS), a portable subscriber station (PSS), user equipment (UE), an access terminal (AT), and the like, or may include entire or partial functions of the MS, MT, SS, PSS, UE, AT, and the like.

[0016] In the present disclosure, an access point (AP) may be referred to as a base station (BS), a radio access station (RAS), a Node B, an evolved Node B (eNodeB), a base transceiver station (BTS), a mobile multihop relay (MMR)-BS, and the like, and include the entire or partial functions of the BS, RAS, Node B, eNodeB, BTS, MMR-BS, and the like.

[0017] FIG. 1 is a view illustrating transmission of signals by a plurality of terminals to a common terminal in a wireless network.

[0018] With reference to FIG. 1, terminal 1 transmits a request message to terminals 2 and 3. The request message may be transmitted in a multicast or broadcast manner. The terminals 2 and 3 transmit a response message with respect to the request message, respectively. In this case, the terminals 2 and 3 use a short inter-frame space (SIFS) for synchronous transmission. That is, when the terminals 2 and 3 receive the request message from the terminal 1, they transmit the response message with respect to the request message after the lapse of SIFS.

[0019] Here, the synchronous transmission refers signals being transmitted by a plurality of terminals (e.g., the terminals 2 and 3), which independently operate, simultaneously arriving at a common terminal (e.g., the terminal 1) within a certain error range. The plurality of terminals transmitting signals to the common terminal by using synchronous transmission may also be called synchronous transmission terminals. Such a synchronous transmission may be applicable to cooperative communication using a relay, and in this case, one of the terminals 2 and 3 may serve as a relay.

[0020] In this case, the SIFS may have a certain margin of error. For example, the SIFS may have a margin of error within a range of approximately +10% to -10% in one slot time. Assuming that the SIFS is 10 μ s and one slot time is 20 μ s, the SIFS may have a value ranging from 8 μ s to 12 μ s. Thus, there may be a time difference of a maximum of 4 μ s between a time at which the signal transmitted by the terminal 2 arrives at the terminal 1 and a time at which the signal transmitted by the terminal 3 arrives at the terminal 1. In this respect, in an orthogonal frequency division multiplexing (OFDM) system, because the length of a cyclic prefix (CP) is 800ns, the difference between the time at which the signal from the terminal 2 arrives and the time at which the signal from the terminal 3 arrives may be longer than the length of the CP. Thus, the terminal 1 may have difficulty in precisely restoring the signals commonly received from the terminals 1 and 2. Therefore, a novel method for adjusting transmission time points of terminals is required in order to make the signals transmitted by the plurality of terminals, which independently operate, simultaneously arrive at the common terminal.

[0021] FIG. 2 is a schematic block diagram of a terminal according to an exemplary embodiment of the present invention, and FIG. 3 is a flowchart illustrating the process of a method for adjusting transmission time points of terminals according to an exemplary embodiment of the

present invention.

[0022] With reference to FIG. 2, a terminal 200 includes a wireless communication unit 210, a controller 220, a storage unit 230, an input unit 240, and an output unit 250.

[0023] The wireless communication unit 210 performs a wireless communication function of the terminal 200. The wireless communication unit 210 may include an RF unit for transmitting and receiving a radio frequency (RF) signal.

[0024] The controller 220 controls the general operation of the terminal 200. The controller 220 may include a data processing unit for coding and modulating a transmitted signal or demodulating and decoding a received signal.

[0025] The storage unit 230 stores programs for operating the controller 220, and inputted or outputted data.

[0026] The input unit 240 receives data or information for controlling operations of the terminal from the user.

[0027] The output unit 250 displays information processed in the terminal 200 as various types of signals (e.g., audio signal, visual signal, etc.) to the user.

[0028] With reference to FIGS. 2 and 3, the wireless communication unit 210 of the terminal 200 transmits a request frame for adjusting transmission time points to a plurality of synchronous transmission terminals (S300). The request frame includes information regarding a transmission time point at which the synchronous transmission terminals is to transmit a response frame. The transmission time point information may be previously set. The request frame may be multicast or broadcast to the plurality of synchronous transmission terminals, or may be separately transmitted to the plurality of synchronous transmission terminals.

[0029] The synchronous transmission terminals transmit a response frame based on the transmission time point, respectively, and the wireless communication unit 210 of the terminal 200 receives the response frames from the plurality of synchronous transmission terminals (S310). The controller 220 of the terminal 200 calculates the difference in arrival time of the response frames (S320). The difference in arrival time may be calculated, for example, by using a preamble included in each of the response frame.

[0030] The controller 220 of the terminal 200 resets the transmission time point information by reflecting the difference in arrival time (S330). The wireless communication unit 210 of the terminal 200 retransmits a request frame including the reset transmission time point information to the plurality of synchronous transmission terminals (S340). The steps S310 to S340 may be repeatedly performed until such time as the difference in arrival time of the response frames is within an allowable error range.

[0031] FIGS. 4 and 5 are views illustrating adjusting, by a common terminal, time points of signal transmissions of a plurality of synchronous transmission terminals according to an exemplary embodiment of the present invention, and FIG. 6 is a view illustrating time points at

which signals transmitted by the synchronous transmission terminals according to the exemplary embodiments of FIGS. 4 and 5 arrive at the common terminal.

[0032] With reference to FIGS. 4 and 5, the terminal 1 transmits a request frame including transmission time point information to the terminals 2 and 3, and the terminals 2 and 3 transmit a response frame after the lapse of a certain time interval T_1 according to the transmission time point information. In the case illustrated in FIG. 4, after the terminal receives the response frame, it successively transmits the request frame after the lapse of a certain time T_a . In contrast, in the case illustrated in FIG. 5, the terminal 1 receives the response frame, and when a new transmission opportunity is allocated after the lapse of a certain time, the terminal 1 again transmits a request frame. In the case illustrated in FIG. 4, no other terminal may be involved while the terminal 1 adjusts the transmission time points with the terminals 2 and 3.

[0033] The locations of the terminals 2 and 3 or communication environments of the terminals 2 and 3 may be different. Thus, as shown in FIG. 6, although the terminals 2 and 3 simultaneously transmit a response frame, respectively, there may be a difference between time points at which the response frames of the terminals 2 and 3 arrive at the terminal 1, respectively. Thus, the terminal 1 adjusts the time points at which the terminals 2 and 3 are to transmit the response frames by reflecting the difference in arrival time, and retransmits a request frame including information regarding the adjusted transmission time point to the terminals 2 and 3. Upon receiving the request frame, the terminals 2 and 3 retransmit a response frame after the lapse of the time interval according to the adjusted transmission time point, respectively. Accordingly, the terminal 1 can receive the response frame after the lapse of the adjusted time interval T_1' . The process may be repeatedly performed until such time as the difference in arrival time is within an allowable error range.

[0034] FIGS. 7 and 8 are views illustrating adjusting, by a common terminal, transmission time points of a plurality of synchronous transmission terminals according to another exemplary embodiment of the present invention, and FIG. 9 is a view illustrating time points at which signals transmitted by the synchronous transmission terminals according to the exemplary embodiments of FIGS. 7 and 8 arrive at the common terminal.

[0035] With reference to FIGS. 7 and 8, the terminal 1 transmits a request frame for adjusting a transmission time point to the terminals 2 and 3, and the terminals 2 and 3 transmit a response frame at a response time allocated by the terminal 1, respectively. For example, the terminal 1 may allocate a response time, that is, a transmission time point, such that the terminal 2 can transmit a response frame after the lapse of time T_1 from the request frame, and allocate a response time such that the terminal 3 can transmit a response frame after the lapse of time T_2 from the response frame. Then, the terminals 2 and 3 can transmit a response frame after the lapse of

the allocated response time, respectively. In the case illustrated in FIG. 7, after the terminal 1 receives the response frame, it successively transmits a request frame after the lapse of a certain time T_a . In contrast, in the case illustrated in FIG. 8, after the terminal 1 receives the response frame, it again transmits a request frame when a new transmission opportunity is allocated after the lapse of a certain time. In the case illustrated in FIG. 7, no other terminal may be involved while the terminal 1 adjusts the transmission time points with the terminals 2 and 3.

[0036] As shown in FIG. 9, although the terminals 2 and 3 transmit a response frame at the allocated response time, respectively, there may be an error in time at which the response frames arrive at the terminal 1. For example, the difference between the actual arrival time of the response frame transmitted from the terminal 2 and the actual arrival time of the response frame transmitted from the terminal 3 may be different from a difference T_2 in the estimated arrival time. Then, the terminal 1 resets the response time, that is, the transmission time points, of the terminals 2 and 3 by reflecting the difference in arrival time, and retransmits a request frame including information regarding the reset response time. Upon receiving the request frame, the terminals 2 and 3 may retransmit a response frame after the lapse of the allocated response time, respectively. This process may be repeatedly performed until such time as the difference in arrival time is within an allowable error range.

[0037] FIG. 10 is a flowchart illustrating the process of a method for adjusting a signal transmission time point by the common terminal and the plurality of synchronous transmission terminals according to an exemplary embodiment of the present invention.

[0038] With reference to FIG. 10, the terminal 1 transmits request frames for adjusting transmission time points to the terminals 2 and 3 (S1000). The request frames may include information regarding transmission time points of response frames of the terminals 2 and 3. The information regarding the transmission time points of the response frames may be a certain time interval T_1 from a time point at which the request frame is transmitted to a time point at which a response frame is to be transmitted, and the certain time interval T_1 may be previously set.

[0039] The terminals 2 and 3 transmit a response frame to the terminal 1, respectively, after the lapse of the certain time interval T_1 (S1010). In this case, the terminals 2 and 3 may acquire a synchronization time point by using a preamble included in each of the request frames received from the terminal 1, and start a timer based on the synchronization time point. The terminals 2 and 3 may transmit a response frame, respectively, by using the individually allocated preamble after the lapse of a predetermined time.

[0040] The terminal 1 calculates the difference between an arrival time of the response frame transmitted by the terminal 2 and an arrival time of the response

frame transmitted by the terminal 3 (S1020). The response frames transmitted by the terminals 2 and 3 include a preamble, respectively, distinguished by terminals. Thus, the terminal 1 can calculate the difference in arrival time by performing a correlation operation on the preambles included in the response frames.

[0041] The terminal 1 adjusts information regarding transmission time points of the response frames of the terminals 2 and 3 by reflecting the difference in arrival time (S1030), and transmits request frames including the adjusted information to the terminals 2 and 3 (S1040).

[0042] Here, an example of the adjusted information may include information regarding a synchronous transmission terminal as a reference terminal, information regarding a synchronous transmission terminal as a non-reference terminal, and the information regarding difference in arrival time of the synchronous transmission terminals (or transmission time point adjustment information). Here, the synchronous transmission terminal as a reference terminal may be one of a synchronous transmission terminal of which a response frame has arrived first, a synchronous transmission terminal of which a response frame has arrived at a time closest to an average value, and a synchronous transmission terminal of which a response frame has arrived latest.

[0043] Another example of the adjusted information may include information regarding the respective synchronous transmission terminals and the difference value in arrival time between the respective synchronous transmission terminals (or transmission time point adjustment information).

[0044] Still another example of the adjusted information may include information regarding the respective synchronous transmission terminals and the difference value in arrival time of the respective synchronous transmission terminals over an average arrival time of all the synchronous transmission terminals (or transmission time point adjustment information).

[0045] The terminals 2 and 3 may transmit a response frame to the terminal 1 according to the adjusted information, respectively (S1050), and the terminal 1 repeatedly performs steps S1020 to S1040 until such time as the difference in arrival time is within an allowable error range.

[0046] FIG. 11 is a flowchart illustrating the process of a method for adjusting a signal transmission time point by the common terminal and the plurality of synchronous transmission terminals according to another exemplary embodiment of the present invention.

[0047] With reference to FIG. 11, the terminal 1 transmits request frames for adjusting transmission time points to the terminals 2 and 3 (S1100). The request frames may include a response time allocated to each terminal, that is, transmission time point information. For example, the terminal 1 may allocate the response time, that is, a transmission time point, such that the terminal 2 can transmit a response frame after the lapse of time T_1 from the request frame, and allocate the response

time such that the terminal 3 can transmit a response frame after the lapse of time T_2 from the response frame of the terminal 2.

[0048] The terminals 2 and 3 transmit response frames to the terminal 1 at the respective allocated response time (S1110). In this case, the terminals 2 and 3 may acquire a synchronization time point by using a preamble included in each of the request frames received from the terminal 1, and start a timer based on the synchronization time point. The terminals 2 and 3 may transmit a response frame, respectively, by using the individually allocated preamble after the lapse of a predetermined time. The preambles individually allocated to the terminals 2 and 3 may be the same or different.

[0049] The terminal 1 calculates an arrival time of each of the response frames transmitted by the terminal 2 and the terminal 3 (S1120). The terminal 1 can calculate the arrival time of each of the response frames by performing a correlation operation on the preambles included in the response frames.

[0050] The terminal 1 calculates the arrival time difference in by using the calculated arrival time (S1130). In this case, as illustrated in FIGS. 7 to 9, the arrival time difference may be a difference value between an estimated arrival time difference and an actual arrival time difference.

[0051] The terminal 1 adjusts information regarding transmission time points with respect to a response time allocated to each terminal by reflecting the difference in arrival time (S1140), and transmits request frames including the adjusted transmission time information to the terminals 2 and 3 (S1150).

[0052] Here, an example of the adjusted transmission time point information may include information regarding a synchronous transmission terminal as a reference terminal, information regarding a synchronous transmission terminal as a non-reference terminal, and the information regarding difference in arrival time of the synchronous transmission terminals (or transmission time point adjustment information). Here, the synchronous transmission terminal as a reference terminal may be one of a synchronous transmission terminal of which a response frame has arrived first, a synchronous transmission terminal of which a response frame has arrived at a time closest to an average value, and a synchronous transmission terminal of which a response frame has arrived latest.

[0053] Another example of the adjusted transmission time point information may include information regarding the respective synchronous transmission terminals and information regarding the difference in arrival time (or transmission time point adjustment information).

[0054] The terminals 2 and 3 transmit a response frame to the terminal 1 according to the adjusted information (S1160), and the terminal 1 may repeatedly perform the steps S1120 to S1150 until such time that the difference in arrival time is within an allowable error range.

[0055] The exemplary embodiments of the present invention as described are not implemented only through a device or a method, but may be implemented through a program that can realize a function corresponding to the configuration of the exemplary embodiments of the present invention or a recording medium storing the program.

[0056] While this invention has been described in connection with what is presently considered to be practical exemplary embodiments, it is to be understood that the invention is not limited to the disclosed embodiments, but, on the contrary, is intended to cover various modifications and equivalent arrangements included within the scope of the appended claims.

Claims

1. A method for adjusting, by a first terminal (Terminal 1), a transmission time point of a second terminal (Terminal 2) and a third terminal (Terminal 3) in a wireless network, wherein the second terminal and the third terminal perform cooperative communication with the first terminal, the method comprising:

transmitting a first request frame including information on the transmission time point to the second terminal;
transmitting a second request frame for including information on the transmission time point to the third terminal;
receiving a first response frame transmitted according to the transmission time point from the second terminal;
receiving a second response frame transmitted according to the transmission time point from the third terminal;
adjusting the transmission time point for the second terminal using a difference between an estimated arrival time and an actual arrival time for the first response frame; and
adjusting the transmission time point for the third terminal using a difference between an estimated arrival time and an actual arrival time for the second response frame,
wherein the second request frame is transmitted after the elapse of a certain time at time of transmitting a first request frame.

2. The method of claim 1, further comprising calculating the arrival time by performing a correlation operation on a preamble included in the first response frame, and/or,
wherein the preambles included in the first response frames from the second terminal, and/or,
wherein the transmission time point is set such that the second terminal simultaneously transmit the first response frame, respectively.

3. The method of claim 1, wherein the transmission time points are set such that the second terminal transmits the first response frames such that the first response frames do not overlap with the second response frames transmitted from the third terminal. 5
4. The method of claim 1, wherein the first request frame further comprises a preamble for synchronizing of the second terminal and the third terminal. 10
5. The method of claim 4, wherein the arrival time is calculated by performing a correlation operation on preambles included in the first response frames.
6. A terminal (200) comprising: 15
 - a wireless communication unit (210) and a controller (220),
 - wherein the terminal is adapted to perform the method according to any of claims 1 to 5. 20

Patentansprüche

1. Verfahren zum Einstellen, durch ein erstes Terminal (Terminal 1), eines Übertragungszeitpunkts eines zweiten Terminals (Terminal 2) und eines dritten Terminals (Terminal 3) in einem drahtlosen Netzwerk, wobei das zweite Terminal und das dritte Terminal eine kooperative Kommunikation mit dem ersten Terminal durchführen, wobei das Verfahren umfasst: 25
 - Übertragen eines ersten Anfrageframes, das Informationen über den Übertragungszeitpunkt enthält, an das zweite Terminal; 30
 - Übertragen eines zweiten Anfrageframes, das Informationen über den Übertragungszeitpunkt enthält, an das dritte Terminal; 35
 - Empfangen eines ersten Antwortframes, das gemäß dem Übertragungszeitpunkt übertragen ist, von dem zweiten Terminal; 40
 - Empfangen eines zweiten Antwortframes das gemäß dem Übertragungszeitpunkt übertragen ist, von dem dritten Terminal; 45
 - Einstellen des Übertragungszeitpunkts für das zweite Terminal unter Verwendung einer Differenz zwischen einer geschätzten Ankunftszeit und einer tatsächlichen Ankunftszeit für das erste Antwortframe; und 50
 - Einstellen des Übertragungszeitpunkts für das dritte Terminal unter Verwendung einer Differenz zwischen einer geschätzten Ankunftszeit und einer tatsächlichen Ankunftszeit für das zweite Antwortframe, 55
 - wobei das zweite Anfrageframe nach Ablauf einer bestimmten Zeit zur Zeit der Übertragung eines ersten Anfrageframes übertragen wird.

2. Verfahren nach Anspruch 1, ferner umfassend Berechnen der Ankunftszeit durch Durchführen einer Korrelationsoperation auf einer Präambel, die in dem ersten Antwortframe enthalten ist, und/oder wobei die Präambeln in den ersten Antwortframes von dem zweiten Terminal enthalten sind, und/oder wobei der Übertragungszeitpunkt der Art eingestellt wird, dass das zweite Terminal jeweils gleichzeitig das erste Antwortframe überträgt.
3. Verfahren nach Anspruch 1, wobei die Übertragungszeitpunkte derart eingestellt werden, dass das zweite Terminal die ersten Antwortframes derart überträgt, dass die ersten Antwortframes nicht mit den zweiten Antwortframes überlappen, die von dem dritten Terminal übertragen werden.
4. Verfahren nach Anspruch 1, wobei das erste Anfrageframe ferner eine Präambel zur Synchronisierung des zweiten Terminals und des dritten Terminals umfasst.
5. Verfahren nach Anspruch 4, wobei die Ankunftszeit berechnet wird durch Durchführen einer Korrelationsoperation auf Präambeln, die in den ersten Antwortframes enthalten sind.
6. Terminal (200) umfassend:
 - Eine drahtlose Kommunikationseinheit (210) und einen Controller (220),
 - wobei das Terminal das ausgelegt ist, das Verfahren nach einem der Ansprüche 1-5 durchzuführen.

Revendications

1. Procédé de réglage, par un premier terminal (Terminal 1), d'un point temporel de transmission d'un deuxième terminal (Terminal 2) et d'un troisième terminal (Terminal 3) dans un réseau sans fil, dans lequel le deuxième terminal et le troisième terminal effectuent une communication coopérative avec le premier terminal, le procédé comprenant :
 - la transmission d'une première trame de demande comprenant des informations sur le point temporel de transmission au deuxième terminal ;
 - la transmission d'une deuxième trame de demande pour inclure des informations sur le point temporel de transmission au troisième terminal ;
 - la réception d'une première trame de réponse transmise en fonction du point temporel de transmission à partir du deuxième terminal ;
 - la réception d'une deuxième trame de réponse transmise en fonction du point temporel de

- transmission à partir du troisième terminal ;
 le réglage du point temporel de transmission
 pour le deuxième terminal en utilisant une diffé-
 rence entre un temps d'arrivée estimé et un
 temps d'arrivée réel pour la première trame de 5
 réponse ; et
 le réglage du point temporel de transmission
 pour le troisième terminal en utilisant une diffé-
 rence entre un temps d'arrivée estimé et un
 temps d'arrivée réel pour la deuxième trame de 10
 réponse,
 dans lequel la deuxième trame de demande est
 transmise après l'écoulement d'un certain
 temps au moment de la transmission d'une pre-
 mière trame de demande. 15
2. Procédé selon la revendication 1, comprenant en
 outre
 le calcul du temps d'arrivée en effectuant une opé-
 ration de corrélation sur un préambule inclus dans 20
 la première trame de réponse, et/ou
 dans lequel les préambules inclus dans les premiè-
 res trames de réponse provenant du deuxième ter-
 minal, et/ou
 dans lequel le point temporel de transmission est 25
 réglé de manière que le deuxième terminal trans-
 mette simultanément la première trame de réponse,
 respectivement.
3. Procédé selon la revendication 1, dans lequel les 30
 points temporels de transmission sont réglés de ma-
 nière que le deuxième terminal transmet les premiè-
 res trames de réponse de manière que les premières
 trames de réponse ne chevauchent pas les deuxiè-
 mes trames de réponse transmises à partir du troi- 35
 sième terminal.
4. Procédé selon la revendication 1, dans lequel la pre-
 mière trame de réponse comprend en outre un
 préambule pour la synchronisation du deuxième ter- 40
 minal et du troisième terminal.
5. Procédé selon la revendication 4, dans lequel le
 temps d'arrivée est calculé en effectuant une opé-
 ration de corrélation sur des préambules compris 45
 dans les premières trames de réponse.
6. Terminal (200) comprenant :
- une unité de communication sans fil (210) et un 50
 dispositif de commande (220),
 dans lequel le terminal est adapté pour réaliser
 le procédé selon l'une quelconque des revendications 1 à 5.
 55

FIG. 1

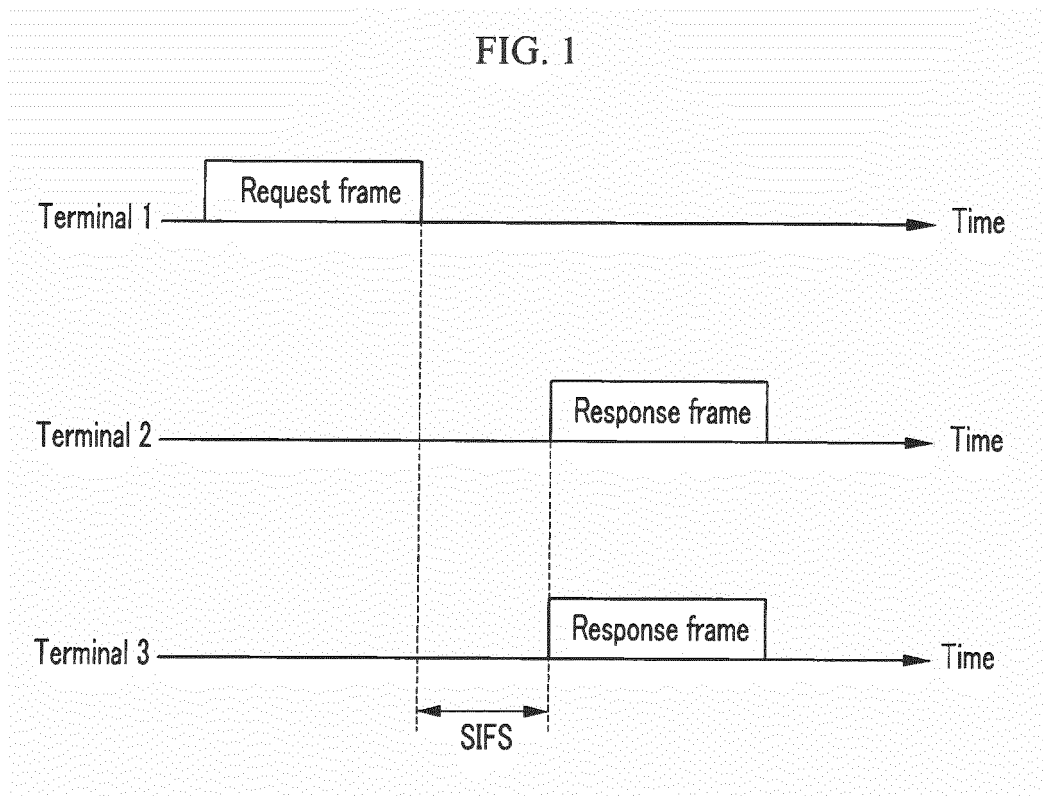


FIG. 2

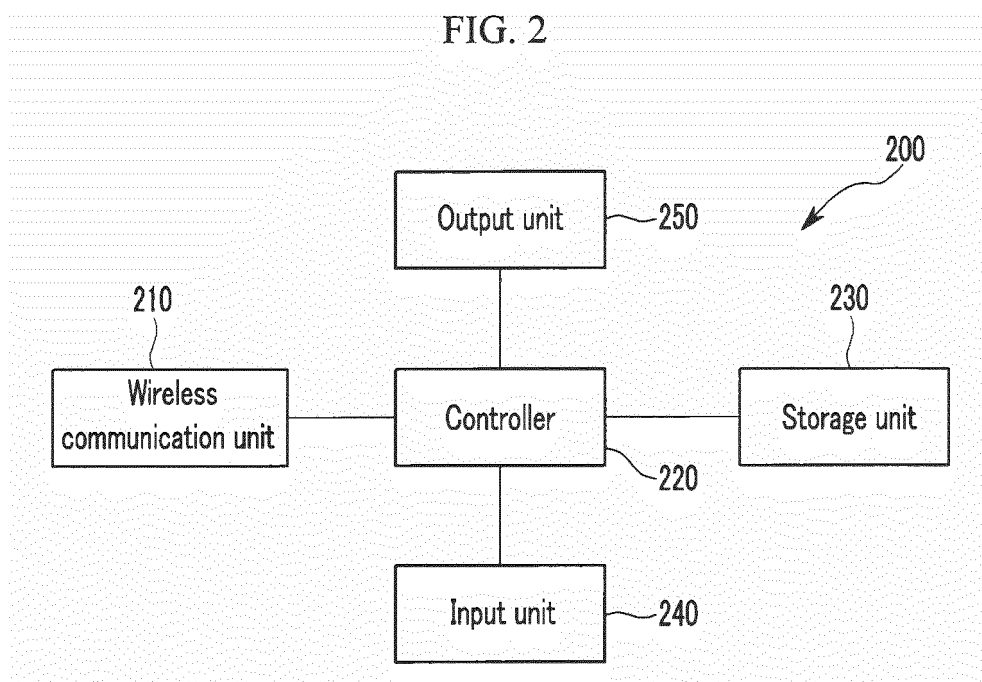
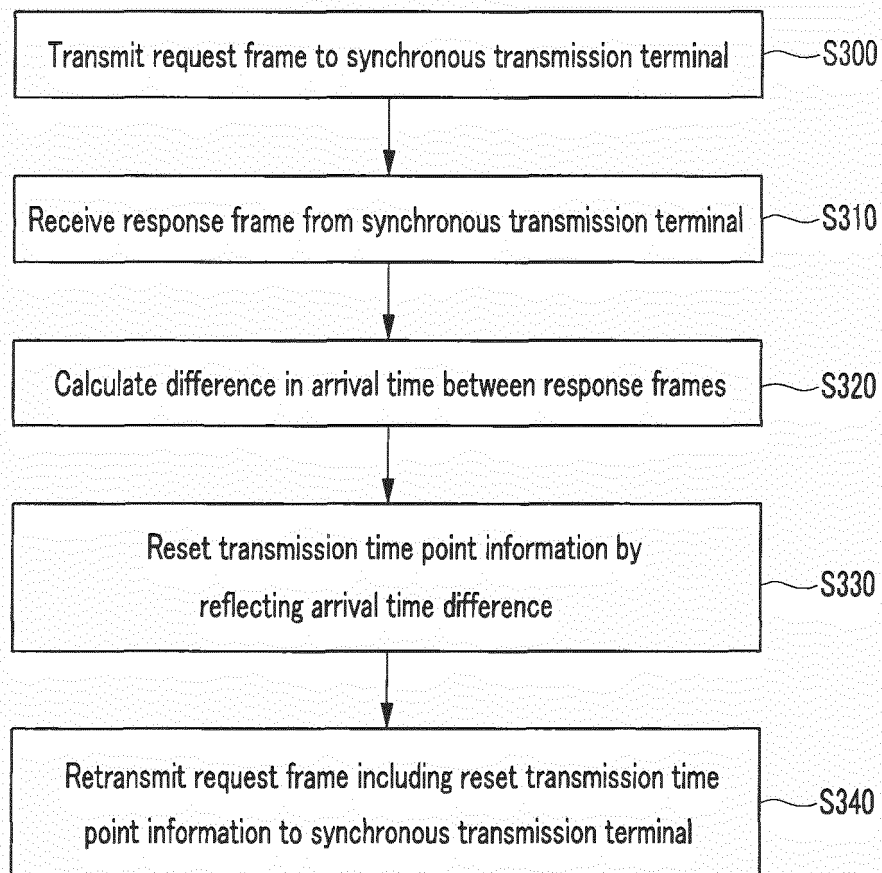


FIG. 3



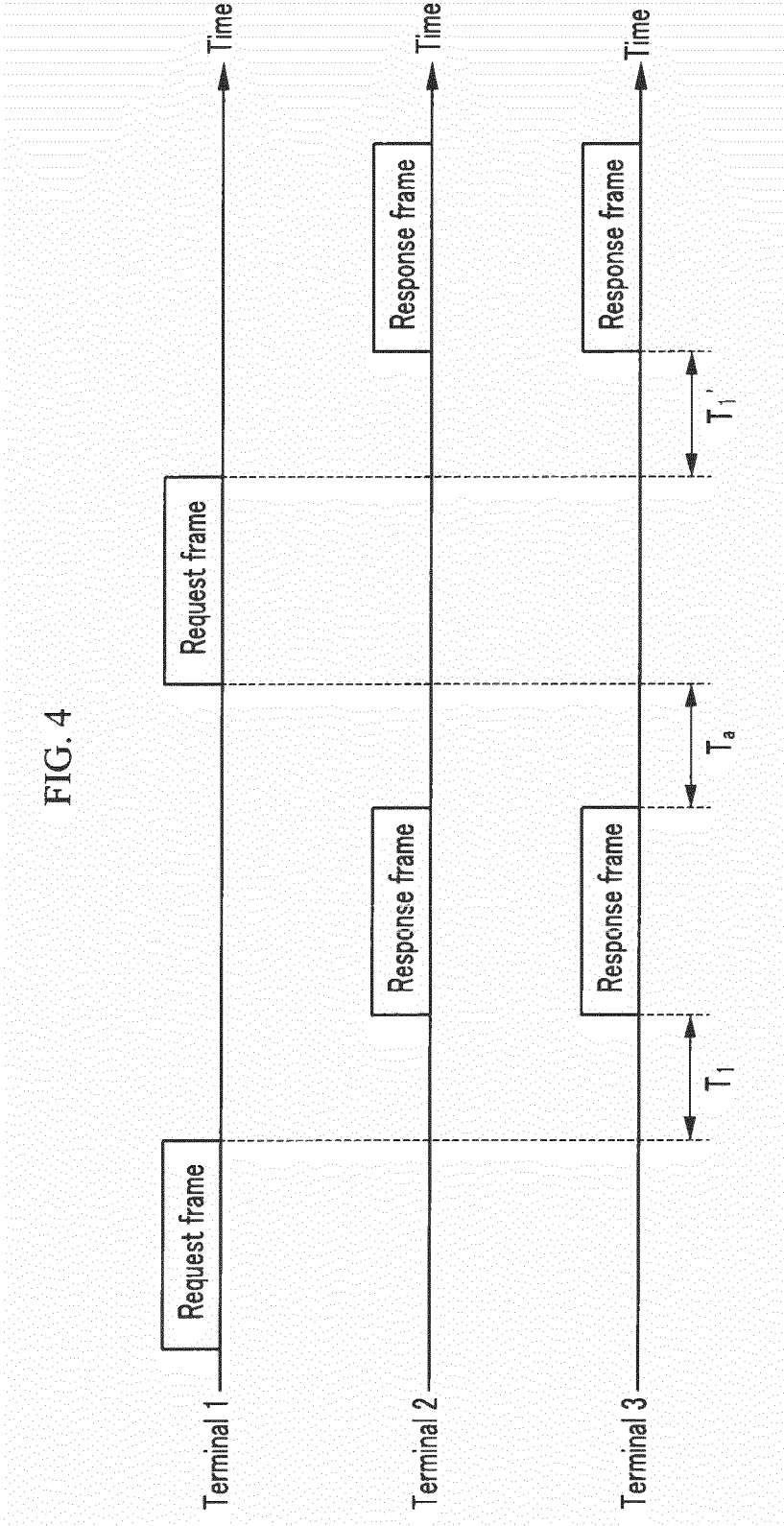


FIG. 5

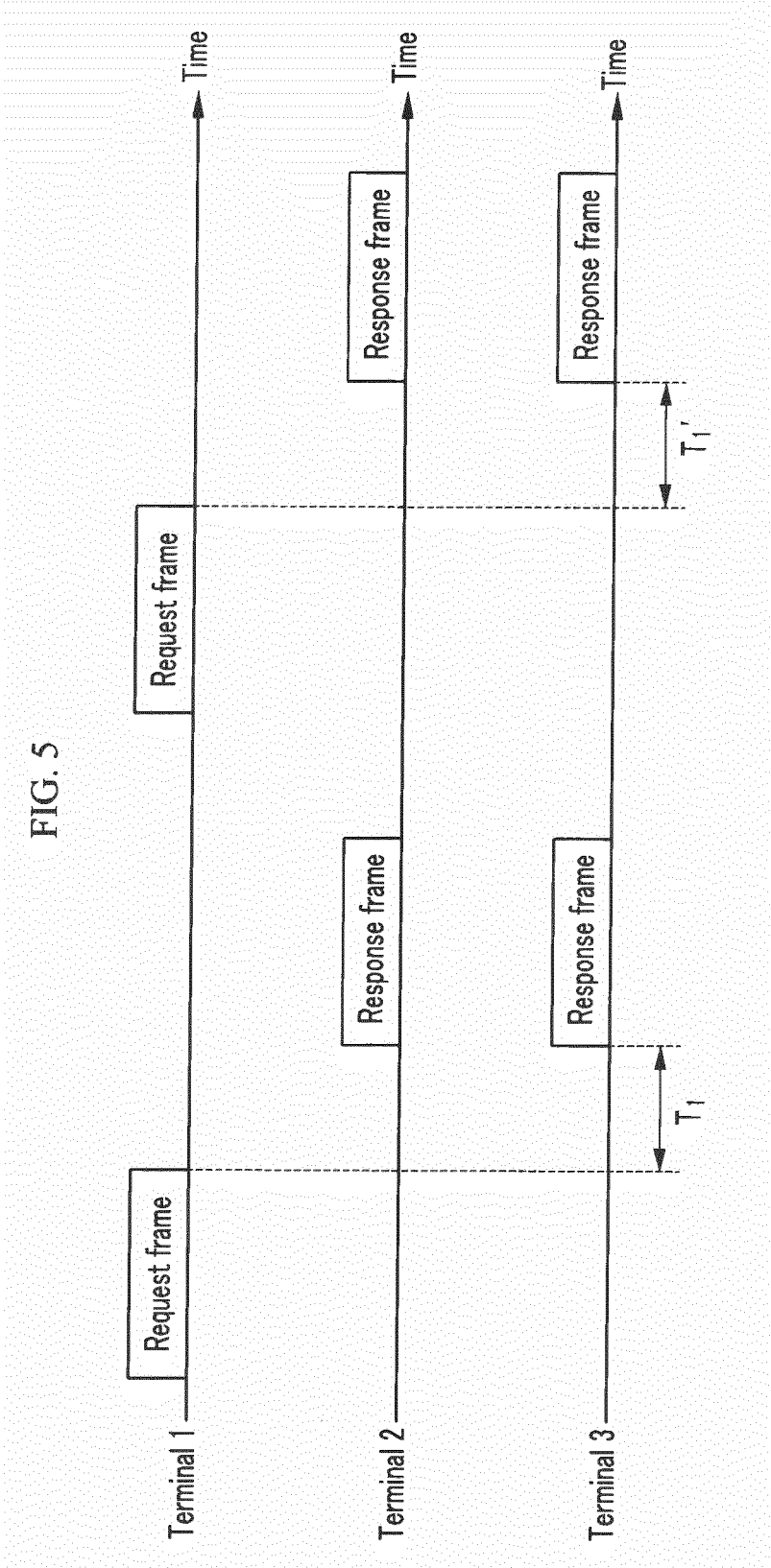


FIG. 6

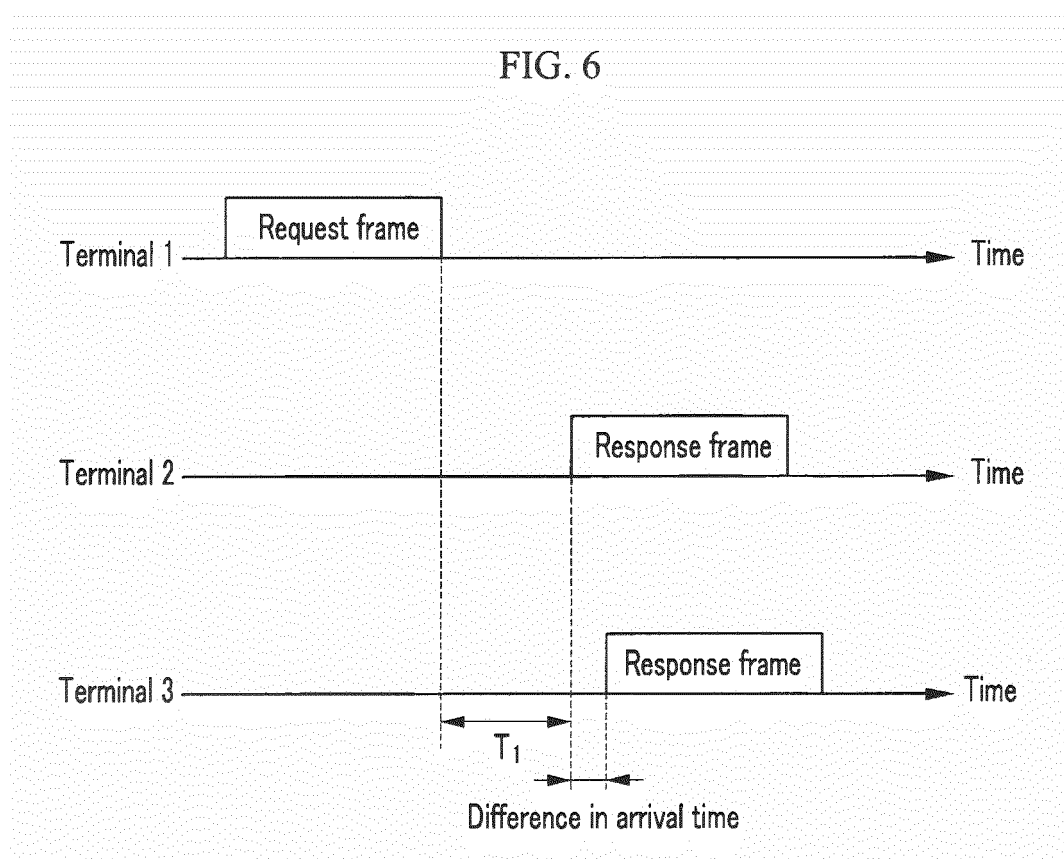


FIG. 7

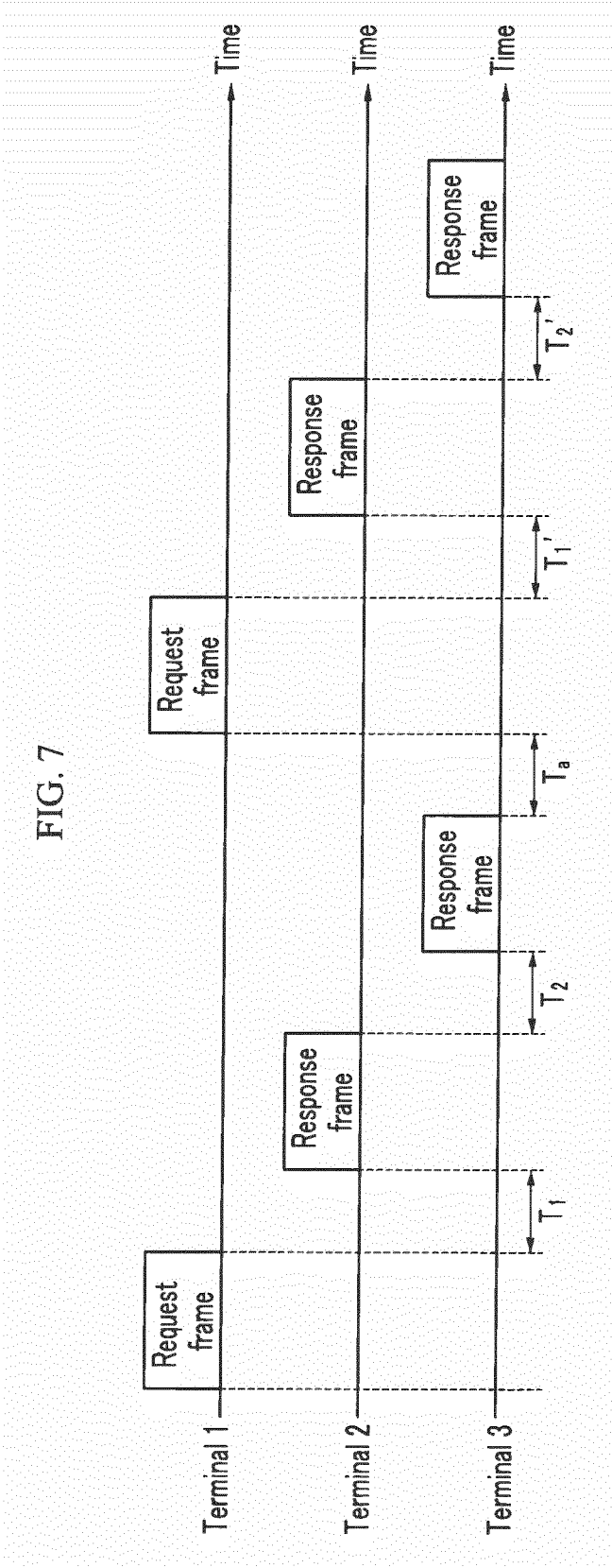


FIG. 8

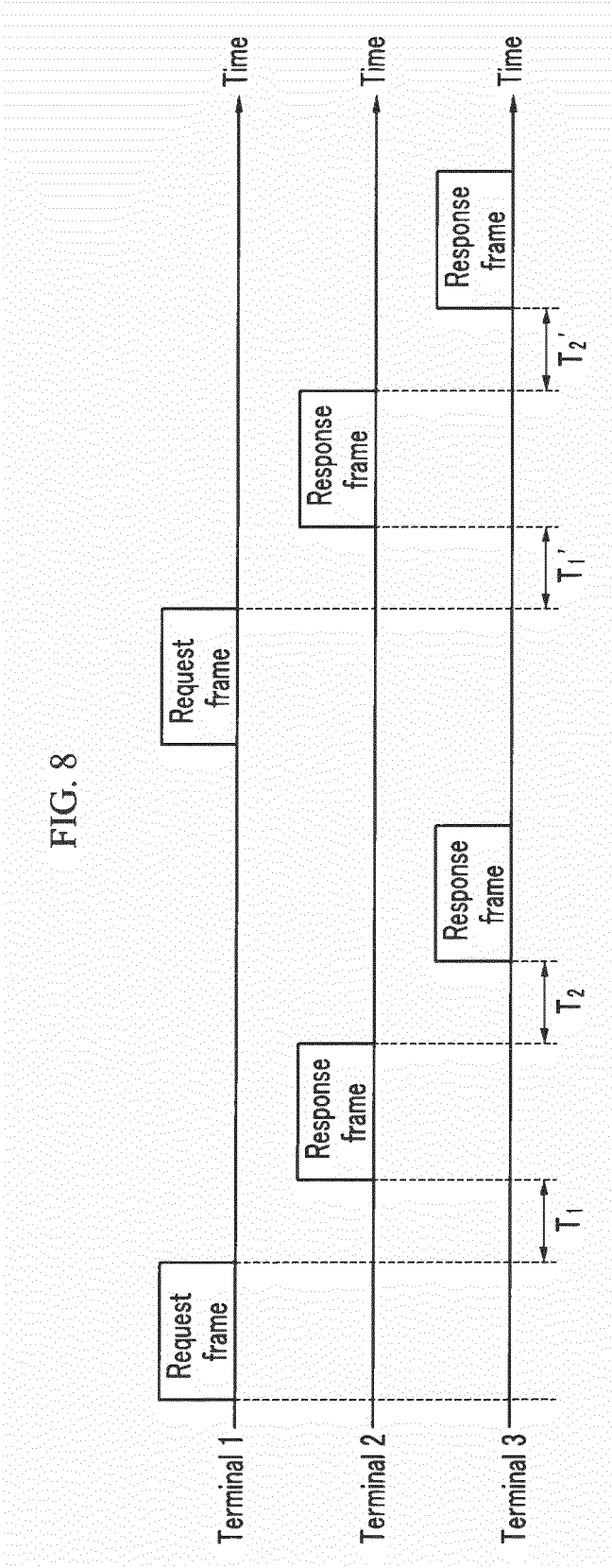


FIG. 9

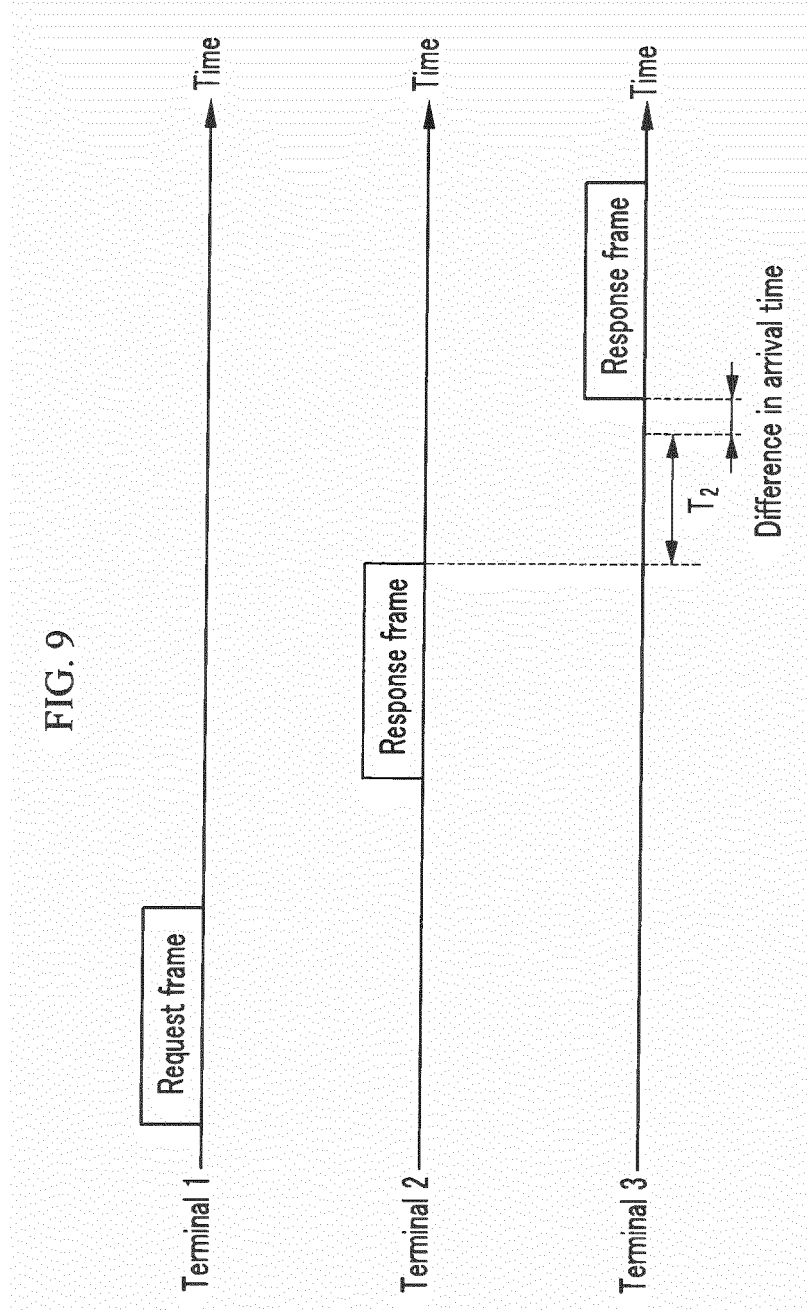


FIG. 10

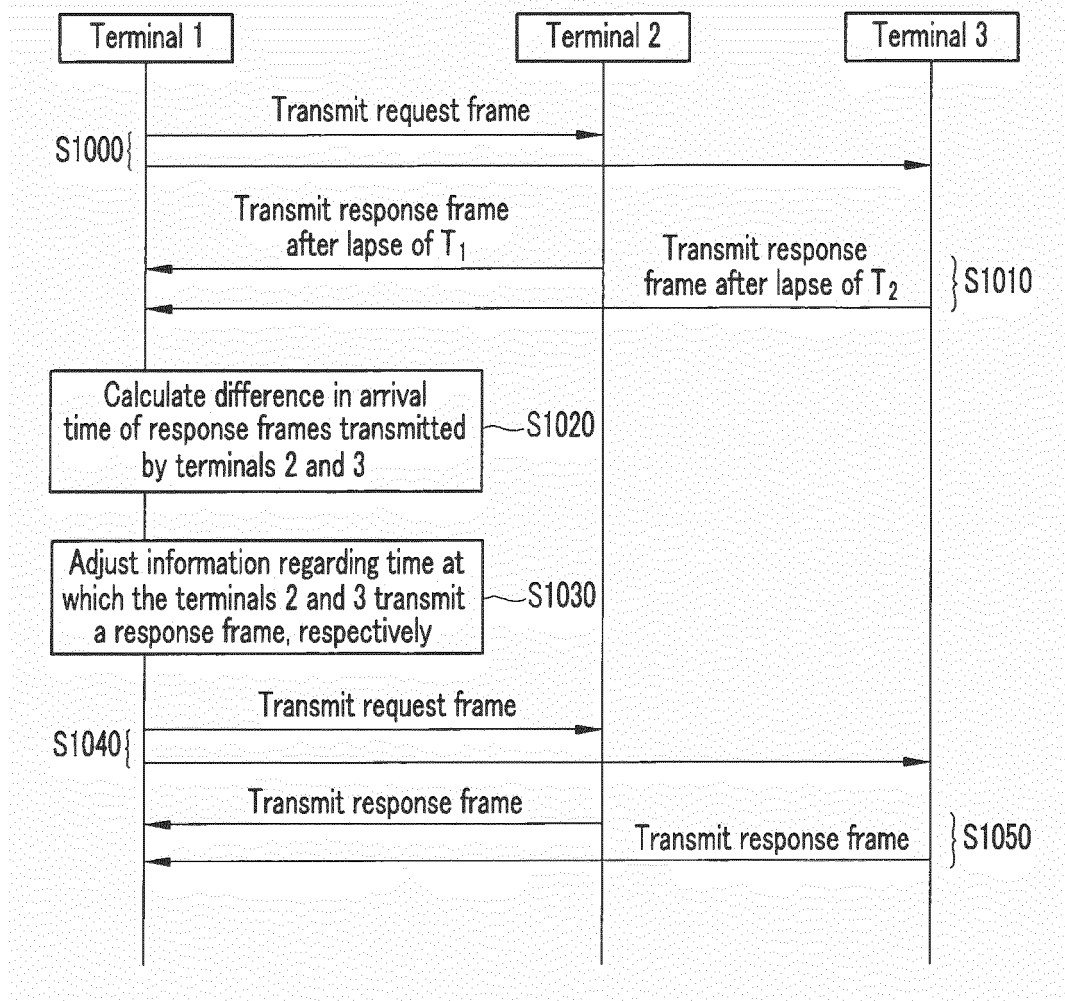
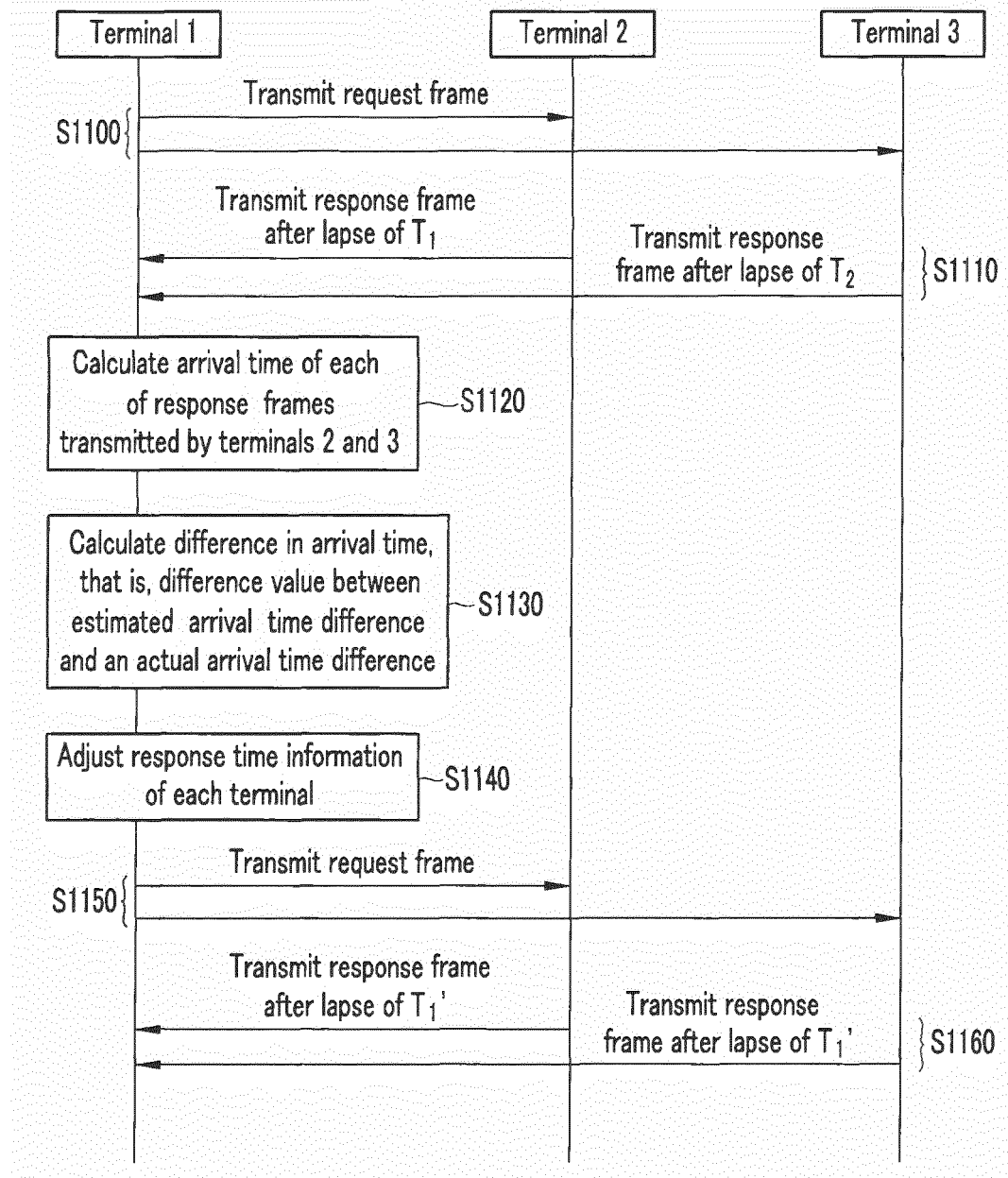


FIG. 11



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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